

APR 25 2006

U.S. Serial No. 10/680,458
Attorney Docket No. PHN 16,650AIN THE SPECIFICATION

Please amend the specification as follows:

On page 1, please insert the following paragraph before the first full paragraph beginning on line 1:

--CROSS-REFERENCE TO RELATED APPLICATIONS

This is a divisional application of U.S. Patent Application Serial No. 09/341,911, filed November 24, 1998, now U.S. Patent 6,661,762, which is herein incorporated by reference in its entirety.--

On page 1, please amend the first full paragraph beginning on line 1, as follows:

--The invention relates to a method as recited in the preamble of Claim 1 generally to the field of digital audio encoding, and more specifically to a method for mapping sampled digital audio information onto a linear physical mapping space that is partitioned into a string of uniform-sized blocks. Present state of the art of digital audio encoding is the well-known Compact Disc system with its ramifications. Progress in storage technology and audio encoding technology allows an increase in the amount of audio information on a unitary medium such as conforming to the standard CD dimensions. A particular feature is variable-rate encoding, which, however, requires an easy accessible indicator organization for subsequent read-accessing of the string of Audio Units.--

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On page 1, please amend the second full paragraph beginning on line 10, as follows:

--In consequence, amongst other things, it is an object of the present invention to allow a reader device to straightforwardly recover all information pertaining to an Audio Unit that may have been dispersed over various storage blocks or sectors. Now therefore, according to one of its aspects, the invention is characterized as recited in the characterizing part of Claim 1 a method for mapping sampled digital audio information onto a linear physical mapping space that is partitioned into a string of uniform-sized blocks. For variable-rate coded audio information that is distributed over successive audio units, each of the successive audio units comprises one or more audio packets, including, in each of said block, a block header for indicating an actual content of the block in question with respect to any constituent packet that contains audio information or contains other information.--

On page 1, please amend the third full paragraph beginning on line 15, as follows:

--The invention also relates to a unitary storage medium produced by ~~practising~~ practicing such method, and to a reader device for reading a unitary storage medium so produced. ~~Further advantageous aspects of the invention are recited in dependent Claims. --~~

On page 2, please amend the last full paragraph beginning on line 27, as follows:

--The audio information is recorded in digital representation after analog to digital (A/D) conversion. Examples of A/D conversion are PCM 16-bit per sample at 44.1 kHz known from CD audio and 1 bit Sigma Delta modulation at a high oversampling rate e.g. $64 \times F_s$ called bitstream. The latter method represents a high quality encoding method, with the choice between high quality decoding and low quality decoding, the latter allowing a simpler decoding circuit. Reference is made in this respect to the publications 'A digital decimating filter for analog-to-digital conversion of hi-fi audio signals', by J.J. van der Kam, document D5 infra (List of Related Documents), and 'A higher order topology for interpolative modulators for oversampling A/D converters', by Kirk C.H. Chao et al, document D6. After A/D conversion, digital audio is compressed to variable bitrate audio data for recording on the information layer. The compressed audio data is read from the record carrier at such a speed, that after decompression substantially the original timescale will be restored when reproducing the audio information continuously. Hence the compressed data must be retrieved from the record carrier at a speed ~~depending~~ depending on the varying bitrate. The data is retrieved from the record carrier at so-called transfer speed, i.e. the speed of transferring data bytes from the record carrier to a de-compressor. The record carrier may have uniform spatial data density, which gives the highest

data storage capacity per unit of area. In such system the transfer speed is proportional to the relative linear speed between the medium and the read/write head. If a buffer is provided before the de-compressor, the actual transfer speed is the speed before that buffer.--

On page 3, please amend the first full paragraph beginning on line 13, as follows:

--Figure 2 shows a playback apparatus according to the invention for reading a record carrier 11 of the type shown in ~~Figure 4~~ Figures 1a-1b. The device has drive means 21 for rotating record carrier 11 and a read head 22 for scanning the record carrier track. Positioning means ~~25 effect~~ 25 affect coarse radial positioning of read head 22. The read head comprises a known optical system with a radiation source for generating a radiation beam 24 that is guided through optical elements and focused to spot 23 on an information layer track. The read head further comprises a focusing actuator for moving the focus of the radiation beam 24 along the optical axis of the radiation beam and a tracking actuator for fine positioning of spot 23 in a radial direction on the ~~centre~~ center of the track. The tracking actuator may comprise coils for moving an optical element or may be arranged for changing the angle of a reflecting element. The radiation reflected by the information layer is detected by a known detector in the read head 22, e.g. a four-quadrant diode, to generate a read signal and

further detector signals including a tracking error and focusing error signals for the tracking and focusing actuators, respectively. The read signal is processed by a reading means 27 to retrieve the data, which reading means are of a usual type for example comprising a channel decoder and an error corrector. The retrieved data is passed to a data selection means 28, to select the compressed audio data for passing on to buffer 29. The selection is based on data type indicators also recorded on the record carrier, e.g. headers in a framed format. From buffer 29, the compressed audio data are passed on to de-compressor 31 as signal 30. This signal may also be outputted to an external de-compressor. De-compressor 31 decodes the compressed audio data to reproduce the original audio information on output 32. The de-compressor may be fitted separately, e.g. in a stand-alone high quality audio digital to analog convertor (D/A convertor), as indicated by dashed rectangle 33 in Figure 2. Alternatively, the buffer may be positioned before the data selections means. The buffer 29 may be positioned in a separate housing or may be combined with a buffer in the decompressor. The device furthermore has a control unit 20 for receiving control commands from a user or from a host computer not shown, that via control lines 26 such as a system bus is connected to drive means 21, positioning means 25, reading means 27 and data selection means 28, and possibly also to buffer 29 for buffer filling level control. To this end, the control unit 20 may comprise control circuitry, such as a microprocessor, a program

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memory and control gates, for performing the procedures described below.

Control unit 20 may be implemented as a logic circuit state machine.--

On page 6, please amend the first full paragraph beginning on line 19, as follows:

--~~Table 4~~ Figure 5 shows a table of the storage format according to the invention, for the same configuration as shown in Figure 4. Here, each column pertains to a single block **M** to **M+4**. Each block starts with a header area, that may have a non-uniform size. Furthermore, each block contains an integer number of packets that may have mutually non-uniform sizes. In addition to the Audio Units, the storage may contain one or more Supplementary Data Units as accessory to a particular Audio Unit, and one or more padding or stuffing units as further accessory to a particular Audio Unit. Padding renders the bit rate constant, and represents dummy data for maintaining an appropriate buffer filling degree. Supplementary data may pertain to an arbitrary layer of functionality, such as the **subcode**.--

On page 7, please amend the first two consecutive paragraphs beginning on line 1, as follows:

--~~Table 2~~ Figure 6 illustrates the syntax of an audio stream according to the invention, written in the well-known Computer Language **C**. The first part

relates to the Audio Mux Stream that contains a looped specification of Audio Blocks numbering 0..N. Note that in the disclosure, N indicates an arbitrary parameter. The number of bits (right hand column) of the block in question is defined by the block length. The second part of the Table is again in C, and relates to a single Audio Block that contains an Audio Block Header and a looped specification of Packets numbering 0...N. The number of bits of the packet in question is defined by its length. As recited, the data may have one of a plurality of respective data types.

~~Table 3~~ Figure 7 shows a header format of a preferred but exemplary embodiment according to the invention, again written in C. The numbers of bits of the various parts have been specified in the right hand column. The first bit indicates whether the block in question contains the beginning point of an Audio Unit. If positive, the following 48 bits specify various parameters of this Audio Unit, to wit: a single bit that indicates the effective start of this Audio Unit, a 30-bit time code for use by a reader device to effect functions such as jumping by a prespecified amount of time. The second part of the header is always present. In the first place, it specifies the distance measured in number of blocks, up to 15, until the next Audio Unit start, to allow a logic jump to the next Audio Unit. Each unit is linked to a single time code, and vice versa. Functionally, the storage may be multiplexed among audio units, padding units, and supplementary data units.--

On page 7, please amend the four consecutive paragraphs beginning on line 33 as follows:

~~Table 4~~ Figure 8 shows a table of the data type specification through the 5 bits indicated therefor by ~~Table 3~~ the table shown in Figure 7. Various ones of the 32 combinations have been reserved. Five are used for specifying various coding types. One indicates the occurrence of CD-text. The remainder has been reserved.

~~Table 5~~ Figure 9 shows an audio block header syntax. The names of the various items, the numbers of bits, the format, and if applicable, the values have been indicated. The frame info can contain a time code. Note that the next unit indicator of Table 3 has been suppressed.

~~Table 6~~ Figure 10 shows a packet information syntax. The names of the various items, the lengths in bits, the format, and if applicable, the values have been indicated.

~~Table 7~~ Figure 11 shows a different data type definition, as varying from the table in Figure 8 ~~Table 4~~. The various types of audio packets can now be defined in the applicable area_TOC. Note that CD TEXT corresponds to a supplementary data packet.--